# Hammond Street at Woodland Road Intersection Improvement Study



## **Town of Brookline**

**Transportation Division** 

**November 9, 2016** 



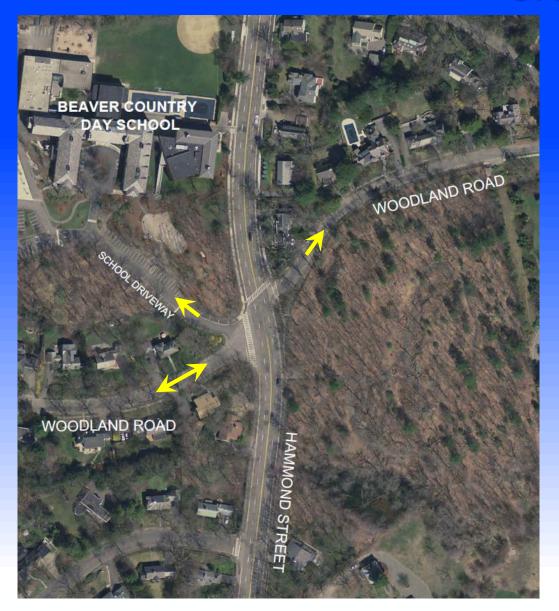
### **AGENDA**

- Study Area
- Project Need
- > Traffic Data
- Alternatives Considered
- Preferred Alternative
- Woodland Road Traffic Calming





## STUDY AREA







#### **PROJECT NEED**

- Long delays on Woodland Road approach
- High speeds on Hammond Street
- Poor sight distance
- > Excess pavement, long crosswalks
- > School traffic
- Cut through traffic
- Brookline Green Routes High Priority Corridor









## **TRAFFIC VOLUMES**

Average Daily Traffic







## TRAFFIC VOLUMES

Peak Hour TrafficMorning (Evening)





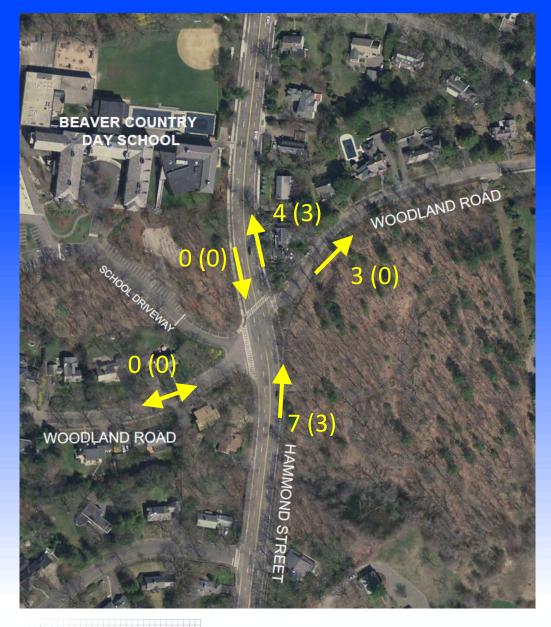


## **PEDESTRIAN VOLUMES**

Peak Hour Pedestrian VolumesMorning (Evening)







## **BICYCLE VOLUMES**

Peak Hour Bicycle Volumes
Morning (Evening)





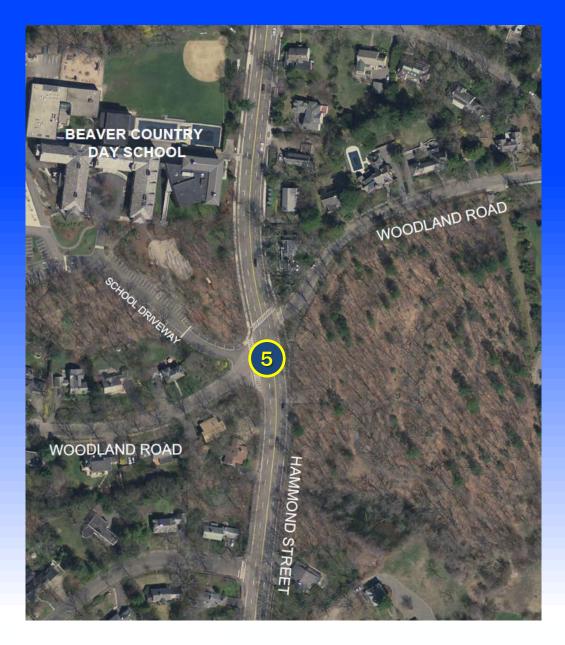


## **VEHICLE SPEEDS**

> 85<sup>th</sup> Percentile Speed (mph)



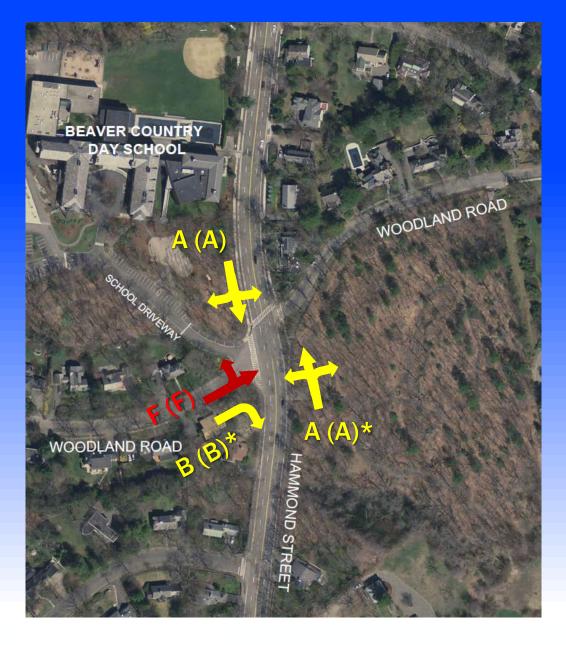




## **CRASH HISTORY**

- > Total crashes, 2009-2013
- One injury crash
- No pedestrian crashes
- One bicycle crash





### TRAFFIC OPERATIONS

- Morning (Evening) Peak Hour Level of Service (LOS)
- \*Northbound left lane & eastbound approach blocked by school traffic in AM



#### GOALS

- Reduce delays & queuing along Woodland Road
- Improve safety for pedestrians
- > Improve sight distance
- Provisions for future bicycle accommodations
- Avoid impacts to school queuing & parking





- Unsignalized with geometric improvements
- Signalized with geometric improvements
- Unsignalized with Road Diet
- Signalized with Road Diet
- Roundabout





#### TRAFFIC SIGNAL WARRANTS



Warrant 1A: Minimum Vehicular Volume

Project Name: Hammond Street at Woodland Road

Project Number:

Located within the built-up area of an isolated community having a population of less than 10,000 (Y/N):

> Major Street: **Hammond Street**

Lanes (each way):

	Volumes (vph)
Hour	Total
12-1 AM	95
1-2 AM	45
2-3 AM	23
3-4 AM	27
4-5 AM	43
5-6 AM	163
6-7 AM	628
7-8 AM	1346
8-9 AM	1340
9-10 AM	1043
10-11 AM	899
11-12 N	865
12-1 PM	869
1-2 PM	861
2-3 PM	933
3-4 PM	1144
4-5 PM	1146
5-6 PM	1324
6-7 PM	1182
7-8 PM	746
8-9 PM	591
9-10 PM	529
10-11 PM	308
11-12 M	186

#### Minor Street: **Woodland Road**

Lanes (approach):

Approach (vp	h)
Total	
2	
0	
0	
1	
0	
3	
23	
201	
108	
80	
107	
74	
55	
69	
67	
146	
109	
170	
150	
43	
73	
17	
10	
10	

Signal Warrant Analysis WARRANT NOT MET

City/Town: Engineer: Data Source: **Brookline** EE June 2014 ATR counts

85th percentile speed of major street traffic exceeds 40 mph (Y/N):

Eight Hour Warrant				
Meets	Meets	Hours		
Major	Minor	Met By		
Street	Street	Both		
Criteria	Criteria	Criteria		
420	105	(8 hours		
vph	vph	needed)		
	.,	necacaj		
x				
X	x	X		
X	X	X		
X				
x	х	X		
X				
x				
X				
X				
x	х	X		
x	х	X		
x	х	X		
X	X	X		
X				
X				
X				

Total hours met:

Warrant 1A - Eight Hour **Volume, Minimum Vehicular Volume** 

Minimum Vehicular Volume (CONDITION A-70%)



#### TRAFFIC SIGNAL WARRANTS



Signal Warrant Analysis

#### Warrant 1B: Interruption of Continuous Traffic

Project Name: Hammond Street at Woodland Road

14-006.02

Located within the built-up area of an isolated community having a population of less than 10,000 (Y/N):

#### Major Street:

**Hammond Street** 

Lanes (each way):

Project Number:

	Volumes (vph)		
Hour	Total		
12-1 AM	95		
1-2 AM	45		
2-3 AM	23		
3-4 AM	27		
4-5 AM	43		
5-6 AM	163		
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7-8 PM	746		
8-9 PM	591		
9-10 PM	529		
10-11 PM	308		
11-12 M	186		

#### Minor Street: **Woodland Road**

N

Lanes (approach):

Approach (vph)
Total
2
0
0
1
0
3
23
201
108
80
107
74
55
69
67
146
109
170
150
43
73
17
10
10

WARRANT MET

City/Town: Brookline Engineer: Data Source: June 2014 ATR counts

85th percentile speed of major street traffic exceeds 40 mph (Y/N):

Eight I	Eight Hour Warrant				
Meets	Meets	Hours			
Major	Minor	Met By			
Street	Street	Both			
Criteria	Criteria	Criteria			
630	53	(8 hours			
vph	vph	needed)			
X	X	х			
X	х	X			
X	х	Х			
X	X	Х			
X	X	X			
X	х	х			
X	х	х			
X	х	Х			
X	Х	Х			
X	Х	Х			
X	Х	X			
X	X	Х			
X					
	х				

Total hours met:

Warrant 1B - Eight Hour Volume, Interruption of **Continuous Traffic** 

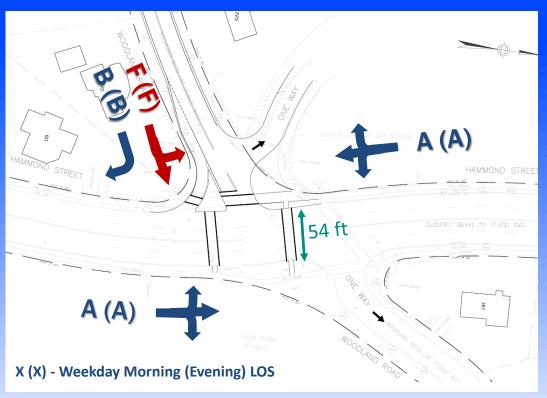


Interruption of Continuous Traffic (CONDITION B-70%)

Unsignalized with geometric improvements



#### Unsignalized with geometric improvements

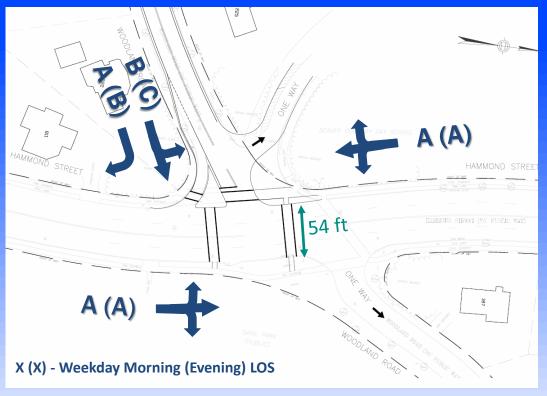


- > Improves Sight Distance
- Shortens Crossing Distances
- Additional Crosswalk
- Removes school driveway from intersection
- No operational improvement
- No provision for bicycles
- No queue space for school traffic





#### Signalized with geometric improvements

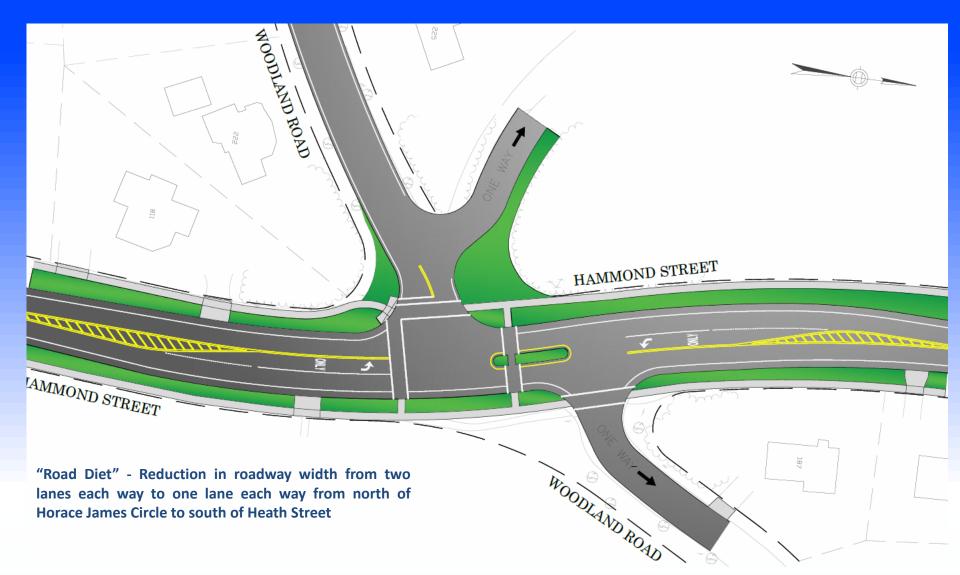


- > Improves Sight Distance
- Shortens Crossing Distances
- Additional Crosswalk Signalized
- Removes school driveway from intersection
- > Operational improvement
- No provision for bicycles
- No queue space for school traffic

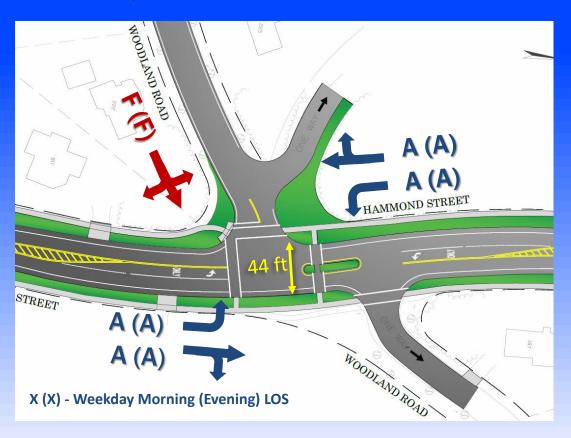




### Unsignalized with Road Diet



#### Unsignalized with Road Diet

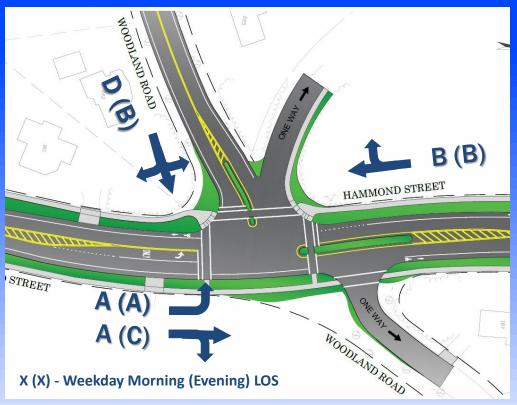


- Improves Sight Distance
- Shortens Crossing Distances
- Additional Crosswalk
- Removes school driveway from intersection
- Queue space for school traffic
- Provisions for on-street/offstreet bicycle accommodation
- > No operational improvement





#### Signalized with Road Diet



- Improves Sight Distance
- Shortens Crossing Distances
- Additional Crosswalk Signalized
- Provisions for on-street/off-street bicycle accommodation
- Operational improvement
- Eliminates school entrance traffic from Woodland Road
- Queue space on northbound
   Hammond Street for school traffic
- Discourages cut-through traffic on Woodland Road

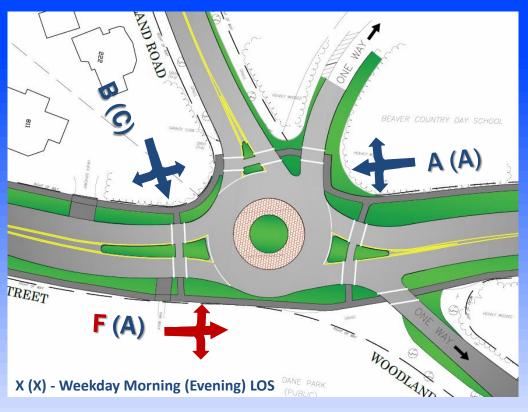




#### Roundabout



#### Roundabout



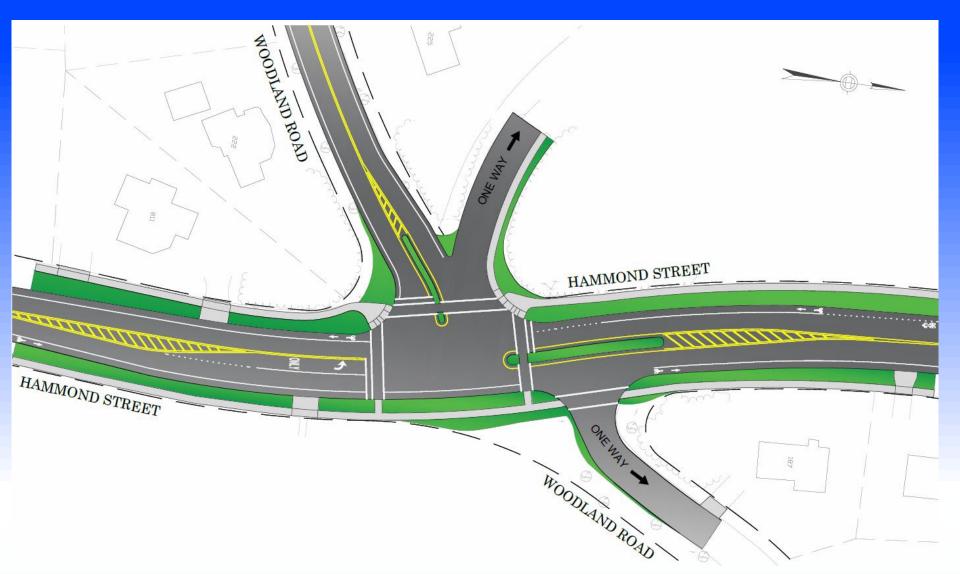
- Improves Sight Distance
- Shortens Crossing Distances
- Additional Crosswalk
- Provisions for off-street bicycle accommodation
- School traffic blocks roundabout in the morning
- No queue space on northbound Hammond Street





## PREFERRED ALTERNATIVE

## Signalized with Road Diet



#### PREFERRED ALTERNATIVE

#### Signalized with Road Diet

- Northbound widens to two lanes at Heath Street
- Southbound widens to two lanes southbound at Horace James Circle
- Fully actuated signal with optical emergency vehicle detection

#### Next Steps

- Additional analysis
- Engineered Design
- > Funding
- **Construction**





#### **QUESTIONS?**



